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PATENT SPECIFICATION



Application Date: March 28, 1941. No. 4171/41.

548,209

Complete Specification Left: March 25, 1942.

Complete Specification Accepted: Sept. 30, 1942.

PROVISIONAL SPECIFICATION

Improvements in and relating to Belting and the Manufacture thereof

We, DUNLOP RUBBER COMPANY LIMITED, a British Company, of Dunlop House, 1, Albany Street, in the County of London, and WILFRID LORD and SIDNEY ALBERT BRAZIER, both British Subjects, and both of the aforesaid Company's Works at Cambridge Street, Manchester, do hereby declare the nature of this invention to be as follows:—

10 This invention comprises improvements in and relating to belting and the manufacture thereof and more particularly is concerned with belting of the type consisting of a combination of textile fabric usually a woven textile fabric, commonly referred to as "duck" with rubber or the like.

The present invention is, in particular, concerned with the construction and arrangement of the textile components of such belting in specific relation to the accommodation and effective functioning of belt fastening or jointing means hereinafter described.

25 The object of the present invention, is to provide improved arrangements for the accommodation of the belt fastening means by a novel and improved construction of the aforesaid textile component prior to its being combined with the rubber component.

The conventional type of belting duck is a heavy plain woven fabric made with a greater amount of warp yarn than weft 35 yarn, so that a high tensile strength in the warp direction is obtained. It is well known, however, that the fabric has to be made fairly dense in construction in order to provide a high resistance to 40 belt fastener movement and shear.

To obtain this firmness of texture it is usual to weave the cloth with a relatively high number of coarse weft threads with the result that a fabric is obtained 45 having a high warp tensile strength and a fairly high weft tensile strength.

This type of conventional belting duck construction has several disadvantages which provide difficulties in the process 50 of belt construction.

These disadvantages are very largely due to the presence of the large proportion of weft yarn which does not, in

itself, contribute to the ultimate efficiency of the belt.

Also, the conventional construction provides the anomaly of a belting duck designed to give a high tensile strength in the warp direction, but with the belt fasteners held by the weft yarn and as a result the belt fasteners pull out of the weft yarn or shear through the weft yarn at a load which is often in the region of, or less than, 50% of the tensile strength of the belt in the warp direction.

Another serious disadvantage of the conventional type of belting duck is that the presence of such a high proportion of weft yarn seriously affects the amount and size of the warp yarn which can be used in the fabric, with the result that belting duck design and construction is limited by considerations based upon the use of a high proportion of weft yarn.

The present invention proposes the construction of a belting fabric in which the belt joint fastener bars or pins are held or mainly held or secured by the warp yarn.

According to this invention, in belting of the type set forth, the textile fabric component comprises, in combination with warp threads which may be of high tensile strength, textile constructions located weftwise of the fabric and essentially providing pockets or passages which extend transverse of the belt, substantially at right angles to the longitudinally disposed warp threads and completely through the belt from side to side and be located within the thickness of the complete belt.

The purpose of these sockets or passages is to accommodate the means or part of the means employed for fastening the ends of the belt together.

Such means may consist of fastener bars of suitable material such as metal or wood or hard plastic substance such as ebonite or bakelite.

The textile constructions providing the pockets or passages may comprise tubular banding which may be made for example by braiding, weaving or knitting.

The tubular construction may be made of cotton, rayon, wool, silk, linen or other

[Price 1/-]

natural or synthetic fibre or filament.

Alternatively a tubular construction may be extruded or otherwise produced of any material suitable to the purpose and arrangements according to this invention and positioned weftwise of the fabric.

Protection can be provided, if desired, for the inside surface of the tubular construction by the provision of a lining composed of a sleeve of rubber compound etc., which may be incorporated in the tubular band before, during or after manufacture.

15 The desired protection may be obtained by the use of lubricating materials such as talc, zinc stearate, graphite etc., which may be incorporated with the tubular construction either before or 20 after manufacture.

The use of tubular weft in this way results in considerably less warp crimp due to less interlacing of the warp warp threads with the much reduced 25 number of weft elements, and hence the possibility of stretch is correspondingly reduced.

Alternatively the tubular construction 30 may be used to provide sockets in the conventional type of duck fabric in which case the tubular constructions are woven into the fabric at selected intervals the number of normal weft threads between the tubular constructions would then 35 determine the spacing of the tubular weft.

This method of providing sockets for 40 the insertion of fastener bars or pins allows the construction of a single ply belt, which will have a high tensile strength in the warp direction, so that the necessary strength can be developed in one ply only. Thus in addition to the benefits obtained by the type of joint we 45 also avoid the failures, commonly met with in belting practice, of multi-ply belts failing in use on small diameter pulleys. The greatly enhanced flexibility of such a single ply belt is of

decided advantage.

In such a belt considerable saving in weight is effected for a given strength of belt or alternatively a considerable increase in strength can be obtained for a given weight of belt.

55 In one method of effecting a joint between the two ends of a belt, one end is cut to present, as seen in plan, a projecting tongue or tongues, preferably central of the belt and the other end of the belt is cut to present a complementary recess or recesses into which the said tongue part fits so that the aforesaid passages through the belt are in alignment in order to allow one or more 60 fastener bars to be passed through the belt parts connecting them in hinge fashion.

Instead of rigid fastener bars, flexible 70 material such as catgut, leather strips or textile cords may be employed by threading or lacing through the pockets.

Alternatively, with rigid or substantially rigid fastener bars in position in the square (not cut) ends of the belt the 75 latter may be brought together in butt fashion and the fastening completed by clips, claws, links, laces chains or the like passed through the belt and round or partly round the fastener bars.

80 In this latter arrangement of the butted belt ends carrying fastener bars the conventional type of plate fastener employing rivets, studs or bolts can also be used. In this case the position of the 85 studs, bolts, or rivets, with respect to the belt is made to coincide with the space between the fastener bars.

The fastener bars may be of any desired 90 and convenient thickness and the cross sectional shape of the fastener bars may be circular, oval, rectangular or any other shape and more than one fastener bar or lacing may be accommodated in one passage.

Dated this 25th day of March, 1941.

W. BOND.
Acting for the Applicants.

COMPLETE SPECIFICATION

Improvements in and relating to Belting and the Manufacture thereof

We, DUNLOP RUBBER COMPANY LIMITED, a British Company of Dunlop House, 1, Albany Street, in the County of London, WILFRID LORD and 100 SIDNEY ALBERT BRAZIER, both British Subjects, and both of the aforesaid Company's Works at Cambridge Street, Manchester, do hereby declare the nature of this invention and in what manner the 105 same is to be performed, to be particularly described and ascertained in and by

the following statement:—

This invention comprises improvements in and relating to belting and the manufacture thereof and more particularly is concerned with belting of the type consisting of a combination of textile fabric, commonly referred to as "duck" with rubber or the like.

The present invention is, in particular, concerned with the construction and arrangement of the textile components

of such belting in specific relation to the accommodation and effective functioning of belt fastening or joining means hereinafter described.

5 The object of the present invention, is to provide improved arrangements for the accommodation of the belt fastening means by a novel and improved construction of the aforesaid textile component prior to its being combined with the rubber component.

10 The conventional type of belting duck is a heavy plain woven fabric made with a greater amount of warp yarn than weft 15 yarn, so that a high textile strength in the warp direction is obtained. It is well known, however, that the fabric has to be made fairly dense in construction in order to provide a high resistance to 20 belt fastener movement and shear.

To obtain this firmness of texture it is usual to weave the cloth with a relatively high number of coarse weft threads with the result that a fabric is obtained 25 having a high warp tensile strength and a fairly high weft tensile strength.

30 This type of conventional belting duck construction has several disadvantages which provide difficulties in the process of belt construction.

These disadvantages are very largely due to the presence of the large proportion of weft yarn which does not, in itself, contribute to the ultimate 35 efficiency of the belt.

Also, the conventional construction provides the anomaly of a belting duck designed to give a high tensile strength in the warp direction, but with the belt 40 fasteners held by the weft yarn and as a result the belt fasteners pull out of the weft yarn or shear through the weft yarn at a load which is often in the region of, or less than, 50% of the tensile strength 45 of the belt in the warp direction.

Another serious disadvantage of the conventional type of belting duck is that the presence of such a high proportion of weft yarn seriously affects the amount 50 and size of the warp yarn which can be used in the fabric, with the result that belting duck design and construction is limited by considerations based upon the use of a high proportion of weft yarn.

55 The present invention proposes the construction of a belting fabric in which the belt joint fastener bars or pins are held or mainly held or secured by the warp yarn.

60 According to this invention, in belting of the type set forth, the textile fabric component comprises, in combination with warp threads which may be of high tensile strength, tubular constructions 65 which may be textile constructions

located weftwise of the fabric and essentially providing pockets or passages which extend transverse of the belt, substantially at right angles to the longitudinally disposed warp threads and completely through the belt from side to side, and located within the thickness of the complete belt.

The purpose of these pockets or 70 passages is to accommodate the means or part of the means employed for fastening the ends of the belt together.

Such means may consist of fastener bars of suitable material such as metal or wood or hard plastic substance such as 80 ebonite or bakelite (Registered Trade Mark).

The textile constructions providing 85 the pockets or passages may comprise tubular banding which may be made, for example, by braiding, weaving or knitting.

The tubular construction may be made 90 of cotton, rayon, wool, silk, linen or other natural or synthetic fibre or filament.

Alternatively a tubular construction 95 may be extruded or otherwise produced of any material suitable to the purpose and arrangements according to this invention and positioned weftwise of the fabric.

Protection can be provided, if desired, for the inside surface of the tubular construction by the provision of a lining 100 composed of a sleeve of rubber compound etc., which may be incorporated in the tubular band before, during or after manufacture.

The desired protection may be obtained 105 by the use of lubricating materials such as talc, zinc stearate, or graphite, which may be incorporated with the tubular construction either during or after manufacture.

110 The use of tubular weft in this way results in considerably less warp crimp due to less interlacing of the warp threads with the much reduced number of weft elements, and hence the possibility of stretch is correspondingly reduced.

115 Alternatively the tubular constructions may be used to provide pockets in the conventional type of duck fabric in which case the tubular constructions are woven into the fabric at selected intervals; the number of normal weft threads between the tubular constructions would then determine the spacing of the tubular weft.

120 This method of providing pockets for the insertion of fastener bars or pins allows the construction of a single ply belt, which will have a high tensile 125 strength.

strength in the warp direction so that the necessary strength can be developed in one ply only. Thus in addition to the benefits obtained by the type of joint we 5 also avoid the failures, commonly met with in belting practice, of multi-ply belts failing in use on small diameter pulleys. The greatly enhanced flexibility of such a single ply belt is of 10 decided advantage.

In such a belt considerable saving in weight is effected for a given strength of belt or alternatively a considerable increase in strength can be obtained for 15 a given weight of belt.

While the use of tubular constructions as weft with high tensile cords in the warp allows a single ply belt to be made, we do not limit the application to single 20 ply constructions only. Laminated belts can be made with this material in the same way as with conventional belting fabric.

In one method of effecting a joint 25 between the two ends of a belt, one end is cut to present, as seen in plan, a projecting tongue or tongues, preferably central of the belt and the other end of the belt is cut to present a complementary recess or recesses into which the said 30 tongue part fits so that the aforesaid passages through the interfitting ends of the belt are in alignment in order to allow one or more fastener bars to be 35 passed through the belt parts connecting them in hinge fashion.

Instead of rigid fastener bars, strands of flexible material such as catgut, leather strips or textile cords may be 40 employed by threading or lacing through the pockets or passages.

With rigid or substantially rigid fastened bars or strands of flexible material in position in the belt and adjusting 45 cent the square (not cut to form tongue and recess) ends the latter may be brought together in butt fashion and the fastening completed by clips, claws, links, laces, chains or the like passed 50 through the thickness of the belt and longitudinally thereof to bridge the butt joint and hooking or looping round or partly round the fastener bars, or strands of flexible material.

55 In this latter arrangement of the butted belt ends carrying fastener bars or strands of flexible material the conventional type of plate fastener employing rivets, studs or bolts can also be used, the 60 plates being positioned to extend longitudinally of the belt and bridge the butt joint. In this case the position of the studs, bolts or rivets with respect to the belt is made to coincide with the space 65 between the fastener bars, or strands of

flexible material.

The fastener bars or strands of flexible material may be of any desired and convenient thickness and the cross sectional shape of the fastener bars or strands of 70 flexible material may be circular, oval, rectangular, or any other shape and more than one fastener bar or lacing strand of flexible material may be accommodated in one passage.

In order that the invention may be more clearly understood and readily carried into practical effect reference is made, in further describing the same, to the accompanying drawings wherein:— 80

Fig. 1 is a plan view of a portion of a textile fabric component for belting in accordance with this invention.

Fig. 2 is a view similar to that of Fig. 1 illustrating a modification in the construction of the textile fabric component. 85

Fig. 3 is a plan view of a portion of belting broken away to show the textile fabric component and illustrating one arrangement whereby belt ends are connected together in accordance with this invention. 90

Fig. 4 is a view similar to that of Fig. 3, illustrating an extension of the arrangements shown in Fig. 3 for connecting the belt ends together. 95

Fig. 5 is a view similar to that of Fig. 3, illustrating a modified arrangement for connecting the belt ends together in accordance with this invention. 100

Fig. 6 is a view similar to that of Fig. 3 illustrating a further modified arrangement for connecting the belt ends together in accordance with this invention.

Referring to the drawings the portion of 105 a textile fabric component for belting shown in Fig. 1 comprises warp threads 1 in combination with tubular textile constructions 2 located weftwise of the fabric and arranged to extend completely 110 through the belt.

In Fig. 2 the tubular textile constructions 2 are in combination with, and spaced apart by, normal weft threads 3. Referring to Fig. 3 the lower part of 115 the figure shows a portion of belting 4 while in the upper part the textile component only is shown.

The textile component is similar to that shown in Fig. 1 consisting of warp 120 threads 1 and tubular textile constructions 2.

In this figure is shown an arrangement for connecting the two ends of the belt together one of which is cut to present a 125 projecting tongue 4a while the other end of the belt is cut to present a complementary recess into which the tongue 4a is fitted as shown so that the passages formed by the tubular construction 2 130

through the interfitting belt ends are in alignment and fastener bars 5 extend completely through the belt parts and complete the connection.

5 Fig. 4 illustrates a belt connection arrangement similar to that of Fig. 3 but here the tongue is extended further into the correspondingly extended recess both of which are stepped down as shown, and 10 thus a greater number of fastener bars 5 are employed in the connection.

In the belt connection illustrated in Fig. 5, the fastener bars 5 are shown in position in the belt 4 and adjacent the 15 ends which butt together, the fastening being completed by links 6 the ends of which hook around the fastener bars 5. Similarly in the construction illustrated in Fig. 6, the belt ends butt together with 20 fastener bars 5 in position adjacent thereto.

Plate fasteners 7 of the conventional type are positioned as shown so that the rivets or the like 8 are arranged to coincide with the space between the fastener bars 5 and thus the fastening is secured.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to 30 be performed, we declare that what we claim is:—

1. Belting of the type set forth wherein the textile fabric component comprises, in combination with warp threads which 35 may be of high tensile strength, tubular constructions which may be textile constructions located weftwise of the fabric and essentially providing pockets or passages which extend transverse of the. 40 belt substantially at right angles to the longitudinally disposed warp threads and completely through the belt from side to side and located within the thickness of the complete belt to accommodate the 45 means or part of the means employed for fastening the ends of the belt together.

2. Belting according to claim 1 said tubular textile constructions providing said pockets or passages comprising 50 tubular banding made, for example, by braiding, weaving, or knitting.

3. Belting according to claim 1 said tubular constructions being extruded of any material suitable to the purpose and 55 arrangements according to this invention.

4. Belting according to either of claims 1 or 2 wherein protection is afforded for the inside surface of the tubular construction by the provision of 60 a lining composed of a sleeve of rubber compound or the like incorporated in the tubular band either before, during, or after manufacture.

5. Belting according to either claim 1 65 or 2 wherein protection is afforded for the

inside surface of the tubular construction by the use of lubricating materials such as talc, zinc stearate, or graphite which may be incorporated with the tubular construction either before or after 70 manufacture.

6. Belting according to any of the preceding claims wherein said tubular constructions are woven into the fabric at selected intervals in combination with 75 normal weft threads.

7. Belting according to any of the preceding claims wherein the said means for fastening the ends of the belt together consist of fastener bars of suitable 80 material such as metal or wood or hard plastic substance such as ebonite or bakelite (Registered Trade Mark).

8. Belting according to any of claims 1 to 6 wherein the said means for fastening 85 the ends of the belt together consist of strands of flexible material such as cat-gut, leather strips or textile cords adapted to be threaded or laced through the said pockets or passages.

9. Belting according to either of claims 7 or 8 wherein more than one fastener bar or lacing strand of flexible material is accommodated in one passage.

10. Belting according to either of 95 claims 7 or 8 wherein a connection between the two ends of a belt comprises one belt end cut to present, as seen in plan, a projecting tongue or tongues preferably central of the belt and the other 100 end of the belt is cut to present a complementary recess or recesses into which the said tongue part is fitted so that the aforesaid passages through the interfitting ends of the belt are in alignment and 105 one or more fastener bars extend through the belt parts connecting them in hinge fashion or flexible material is laced there-through.

11. Belting according to either of 100 claims 7, 8 or 9 wherein fastener bars or strands of flexible material are positioned in the belt and adjacent the ends which butt together and the fastening is completed by clips, claws, links, laces, chains 115 or the like passed through the thickness of the belt and longitudinally thereof to bridge the butt joint, and hooking or looping round or partly round said fastener bars, or strands of flexible 120 material.

12. Belting according to either of claims 7, 8, or 9 wherein fastener bars or strands of flexible material are positioned in the belt and adjacent the ends which 125 butt together and the conventional type of plate fastener employing rivets, studs or bolts is positioned to extend longitudinally of the belt and bridge the butt joint the position of the rivets, studs or 130

bolts with respect to the belt coinciding as described with reference to the accompanying drawings.
with the space between the fastener bars,
or strands of flexible material.

13. The improved belting substantially
as described.

14. The improved belting substantially

Dated this 24th day of March, 1942.

W. BOND,

Acting for the Applicants.

Leamington Spa: Printed for His Majesty's Stationery Office, by the Courier Press.—1942.

[This Drawing is a reproduction of the Original on a reduced scale.]

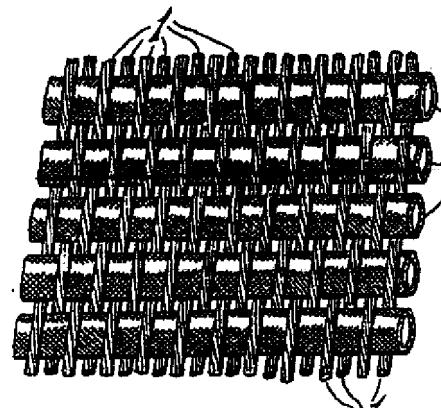


Fig. 1.

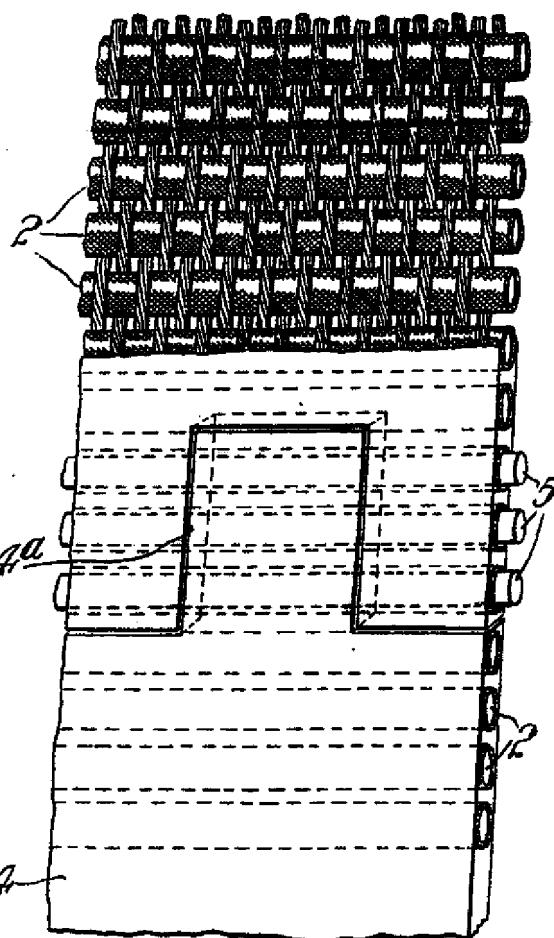


Fig. 2.

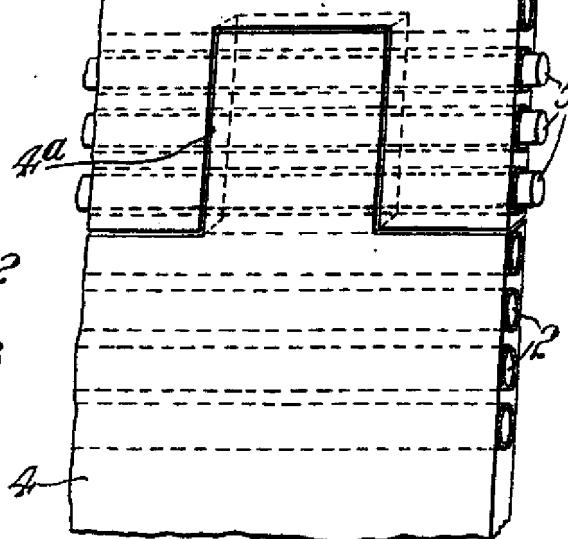


Fig. 3.

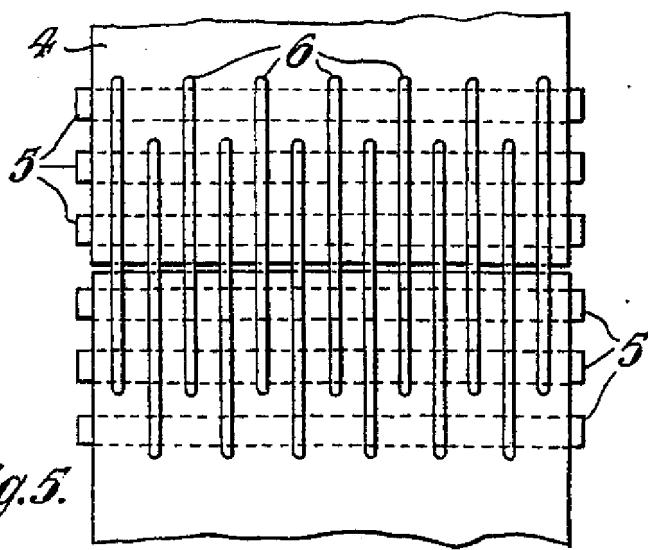


Fig. 5.

SHEET 1

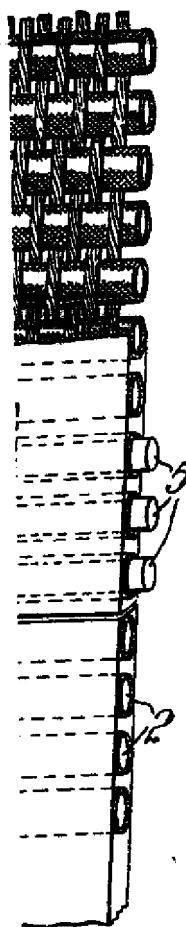


Fig. 3.

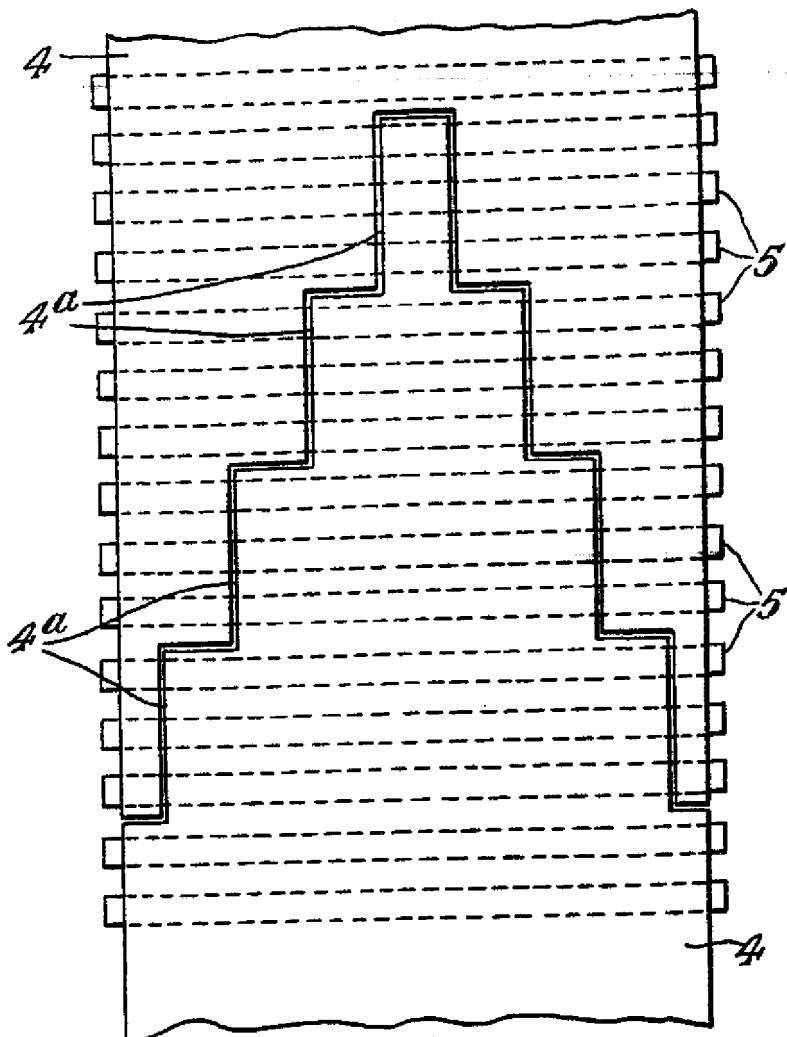


Fig. 4.

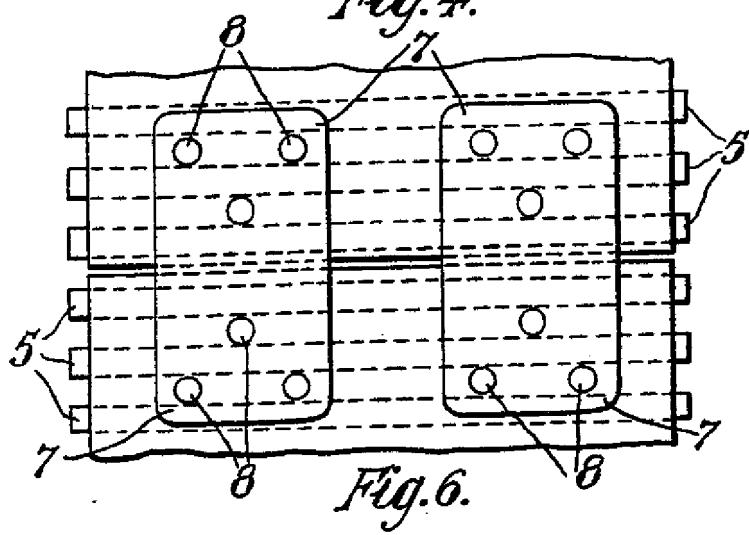
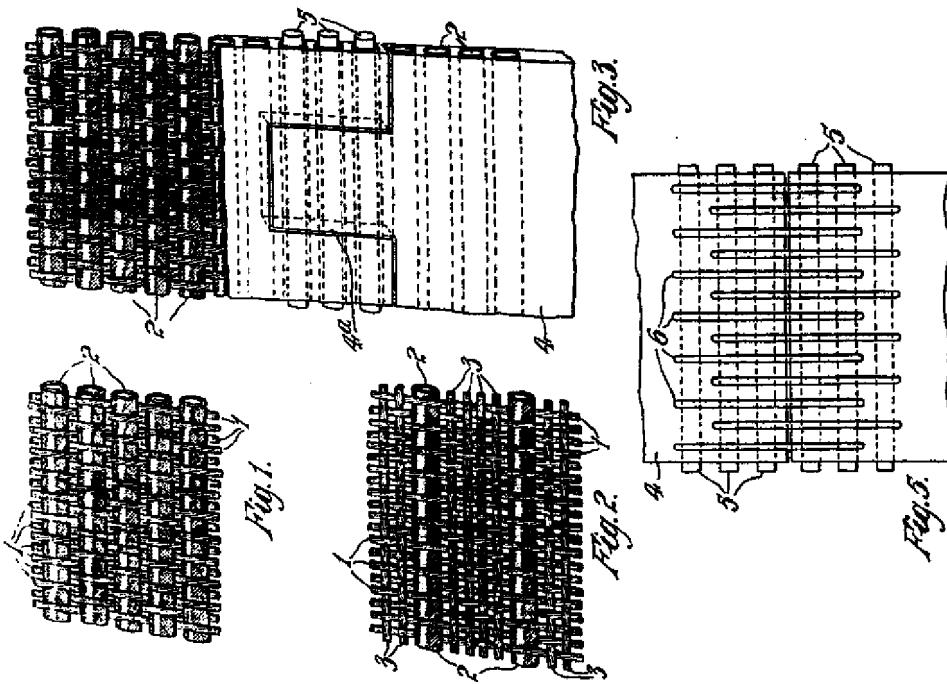


Fig. 6.



[This Drawing is a reproduction of the Original on a reduced scale.]

